**EPA/ROD/R03-01/029**
**2001**

# EPA Superfund
# Record of Decision:

**MARINE CORPS COMBAT DEVELOPMENT COMMAND**
**EPA ID: VA1170024722**
**OU 07**
**QUANTICO, VA**
**06/21/2001**

# SITE 17 - ARSENIC BURIAL AREA

# MARINE CORPS COMBAT DEVELOPMENT COMMAND (MCCDC) QUANTICO, VIRGINIA

# RECORD OF DECISION

# JUNE 2001

# TABLE OF CONTENTS

# TABLES



## FIGURES

# ACRONYM LIST

| | |
|---|---|
| µg/g | micrograms per gram |
| µg/L | micrograms per liter |
| As | Arsenic |
| BTAG | Biological Technical Assistance Group |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act of 1980 |
| COPCs | Chemicals of Potential Concern |
| EPA | Environmental Protection Agency |
| ER,N | Environmental Restoration, Navy |
| HREM | High Resolution Electromagnetic |
| IAS | Initial Assessment Study |
| IR | Installation Restoration |
| MCCDC | Marine Corps Combat Development Command |
| mg/kg | milligrams per kilograms |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan (NCP) |
| NFA | No Further Action |
| NR | Not Reported |
| Pb | Lead |
| RAB | Restoration Advisory Board |
| RBCs | Risk-based Concentrations |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| SSLs | Soil Screening Levels |
| TPH | Total Petroleum Hydrocarbons |
| TRC | Technical Review Committee |
| TtNUS | Tetra Tech NUS, Inc. |
| UTL | Upper Tolerance Limit |
| VADEQ | Commonwealth of Virginia Department of Environmental Quality |

# 1.0 THE DECLARATION

## 1.1 SITE NAME AND LOCATION

Marine Corps Combat Development Command
Quantico, Virginia
CERCLIS ID # VA1170024722
Arsenic Burial Area - Site 17

## 1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedial Action for Site 17 - Arsenic Burial Area, at the Marine Corps Combat Development Command (MCCDC) in Quantico, Virginia. This determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for Site 17.

The Commonwealth of Virginia concurs with the selected remedy.

## 1.3 DESCRIPTION OF THE SELECTED REMEDY

No further CERCLA action is necessary for Site 17 to protect public health, or welfare, or the environment because no unacceptable current or future risks are posed by exposures to the site.

## 1.4 STATUTORY DETERMINATIONS

The Selected Remedy (No Further Action) for Site 17 is protective of human health and the environment because of the previous drum removal activities, and because post removal sampling indicates that there are no unacceptable risks, and arsenic concentrations in soil and groundwater are comparable to literature or site-specific background concentrations.

This remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure; therefore, 5-year reviews will not be required for this remedial action.

## 1.5 AUTHORIZING SIGNATURES

The U.S. Department of the Navy (Navy) and the U.S. Environmental Protection Agency (EPA) selected this remedy with the concurrence of the Commonwealth of Virginia Department of Environmental Quality (VADEQ).

Concur and recommend for immediate implementation:

C. L. Stanley
Major General
U.S. Marine Corps
Commanding General, Marine Corps Base

17 June '01
Date

Abraham Ferdas, Director
Hazardous Site Cleanup Division
U.S. EPA Region III

6/21/01
Date

# 2.0 DECISION SUMMARY

## 2.1 SITE 17 - NAME, LOCATION, AND DESCRIPTION

This Record of Decision (ROD) is issued to describe the Navy's proposed remedial action for Site 17 – Arsenic Burial Area at MCCDC in Quantico, Virginia (Figures 2-1 and 2-2). Site 17, which includes three study areas (Sites 17, 17A, and 17B) is located at the MCCDC facility (Figure 2-3). Site 17 does not include Site L-4j (Old Batch Plant auxiliary site), the location of which is coincident with Site 17B. Site L4j is currently being investigated by the Quantico Project Managers Team (QPMT) as a Desktop Audit with Sampling (DTAWS) site. The National Superfund database identification number for Site 17 is CERCLIS ID # VA1170024722. The Navy serves as the lead agency with Environmental Restoration, Navy Funding (ER, N) serving as the source of funding.

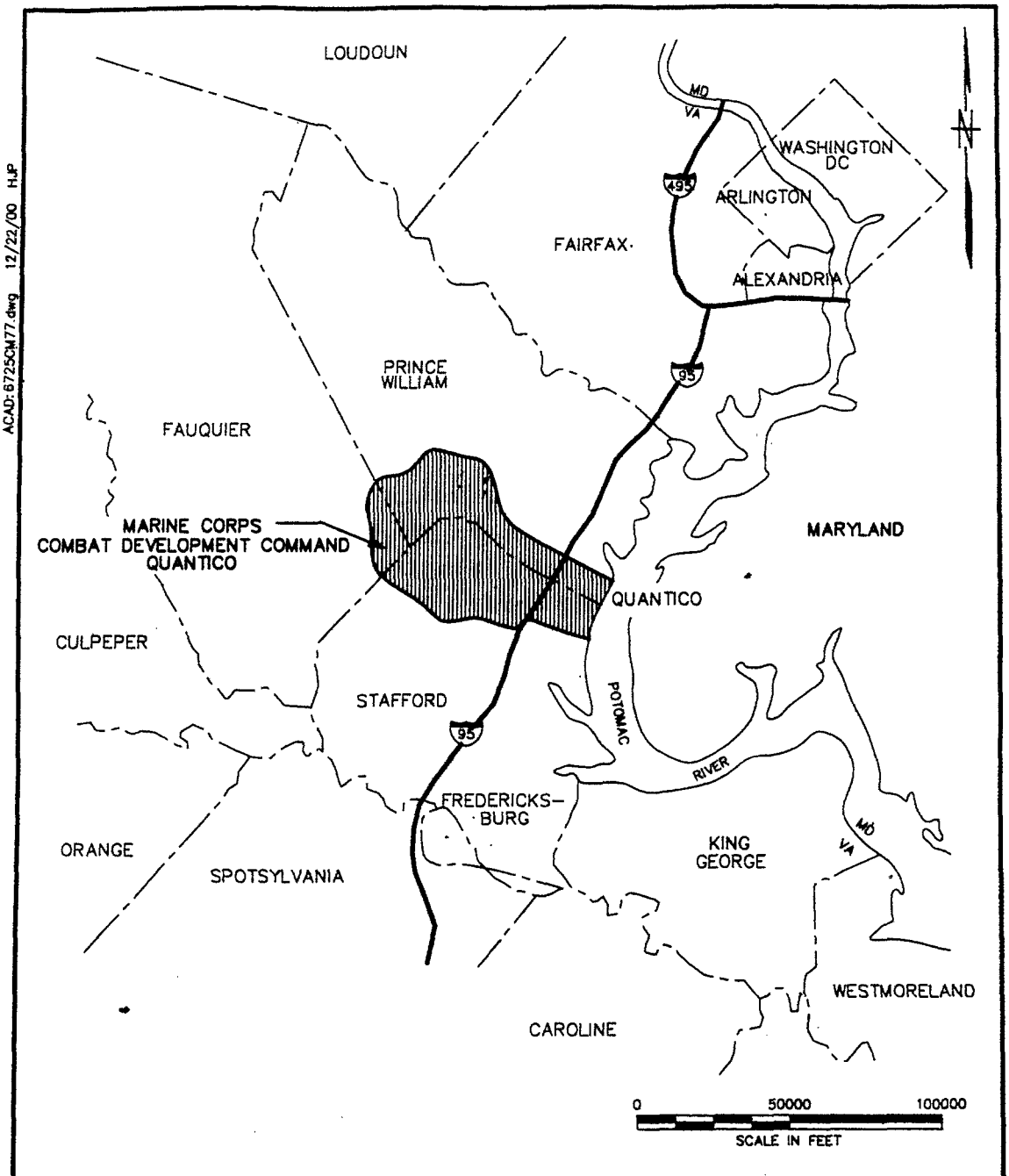
Site 17 consisted of a trench covered with soil, which was suspected to have been used in 1970 for the one-time disposal of drums containing sodium arsenite. The site is located southeast of Building 3247 and south of the Correctional Facility, Building 3237 (Figure 2-4); however, upon investigation of this area no evidence of disposal was identified at this location. Two potential burial areas were subsequently investigated based on additional research activities: Site 17A, located near Bunker 2191, and Site 17B, located south of the original study area along Fitness Trail Road and west of the railroad tracks in the eastern portion of MCCDC (Figure 2-3).

## 2.2 SITE 17 - HISTORY AND ENFORCEMENT HISTORY

### 2.2.1 History of Site Activities

Site 17 is located southeast of Building 3247 and south of Building 3237, the Correctional Facility and consisted of a 10-foot-deep trench covered with soil. The trench was suspected to have been used in 1970 for the one-time disposal of approximately 27 30-gallon drums containing sodium arsenite. However, after several investigations, no evidence of disposal has been identified at this location.

Two other potential burial areas were subsequently investigated based on additional research activities: Site 17A, located near Bunker 2191, and Site 17B, located south of the original study area along Fitness Trail Road and west of the railroad tracks in the eastern portion of MCCDC. Based on the results of a geophysical survey no subsurface anomalies were identified and it was concluded that the sodium arsenite disposal area was not located at Site 17A and, therefore, this location was disregarded as the Arsenic Burial Area. During reconnaissance of the vicinity of Site 17B, two drums labeled as sodium arsenite were located above ground (Figure 2-5), which is in a heavily wooded area of the MCCDC generally used for field training exercises and physical training. Adjacent to this site is Site L-4j, which




| | | | |
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| CHECKED BY DATE | | APPROVED BY | DATE |
| COST/SCHED-AREA | VICINITY MAP MCCDC QUANTICO, VIRGINIA | APPROVED BY | DATE |
| SCALE AS NOTED | | DRAWING NO. FIGURE 2-1 | REV. 0 |

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

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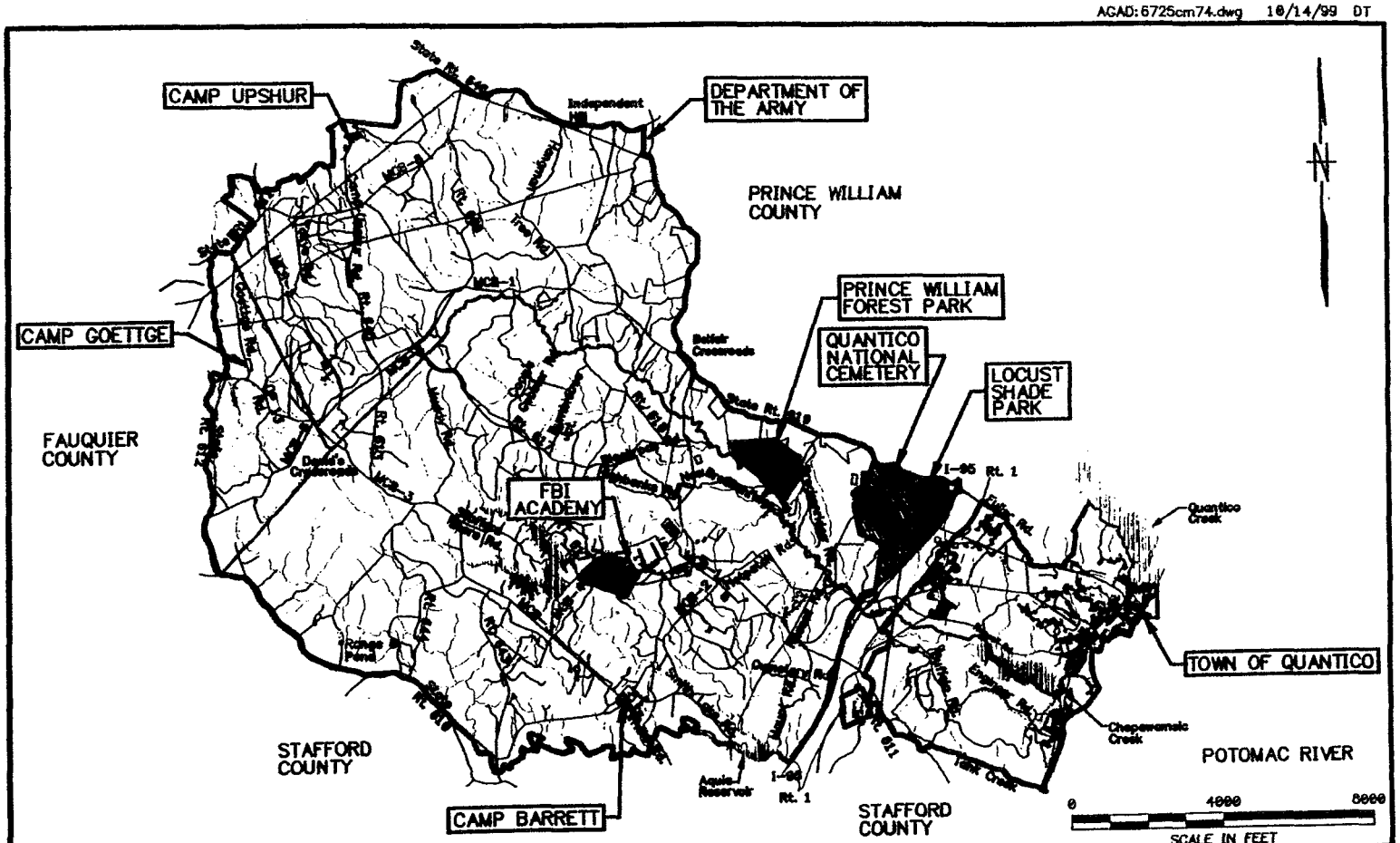


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|---|---|---|---|
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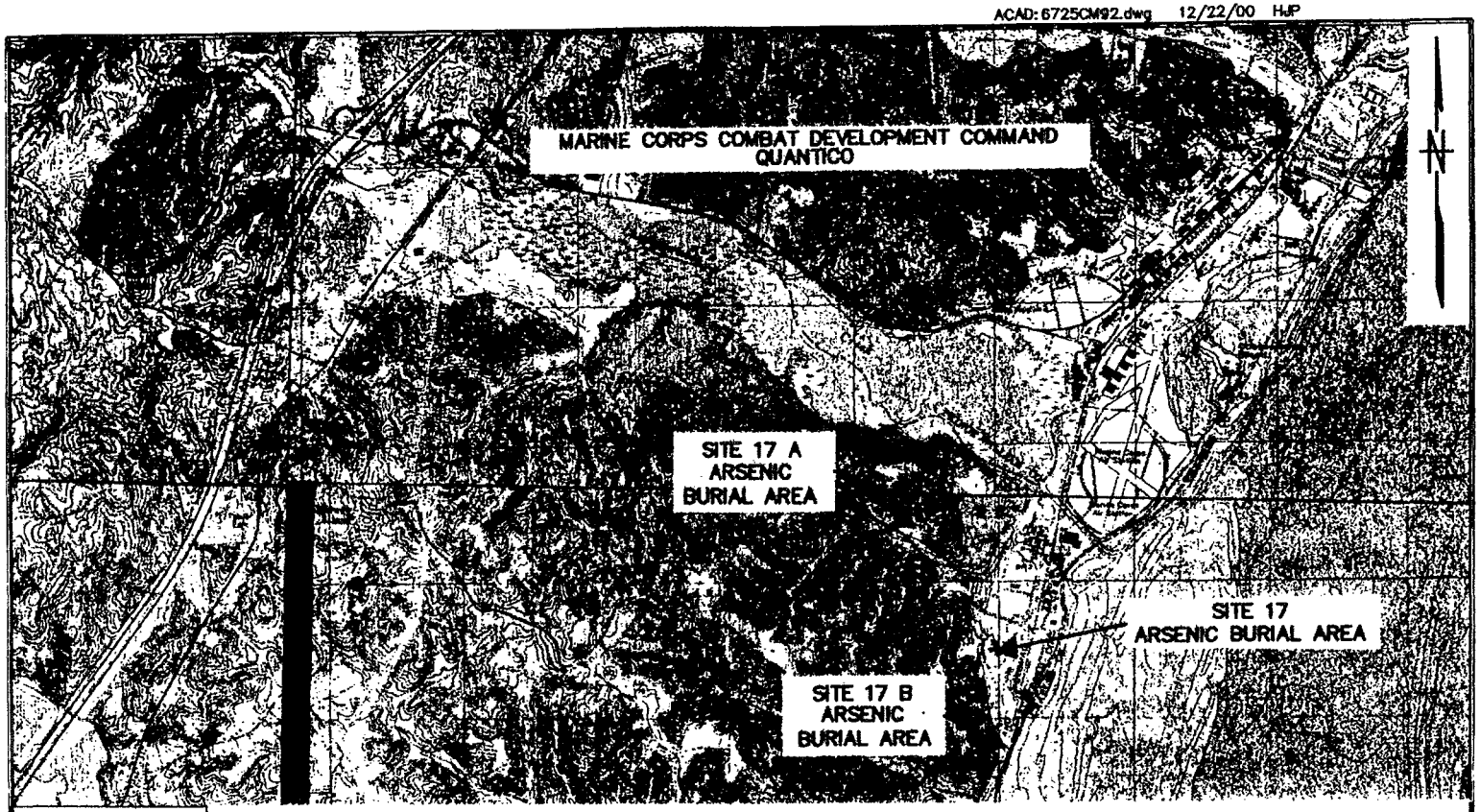
| CHECKED BY KMS DATE 10/13/99 | BASEWIDE SITE MAP<br>MCCDC QUANTICO, VIRGINIA | APPROVED BY Kelly M Snow | DATE 10/13/99 |
| COST/SCHED-AREA | | APPROVED BY | DATE |
| SCALE AS NOTED | | DRAWING NO. FIGURE 2-2 | REV. 0 |

FORM CADD NO. T:\NUS_AH.DWG - REV 0 - 1/22/98

ACAD: 6725CM92.dwg 12/22/00 HJP




VIRGINIA
QUADRANGLE LOCATION

SOURCE: U.S.G.S QUANDRANGLE MAP OF WHITEWATER, VA.–MD. PHOTOREVISED 1978
BATHYMETRY ADDED 1982; STAFFORD, VA 1966, PHOTOREVISED 1983; QUANTICO, VA.–MD.
1966, PHOTOREVISED 1983, BATHYMETRY ADDED 1982; JOPLIN, VA, PHOTOINSPECTED 1981,
1966, PHOTOREVISED 1971.

0 4000 8000
SCALE IN FEET

| | | | |
|---|---|---|---|
| DRAWN BY DATE: HJP 12/12/00 | Tetra Tech NUS, Inc. | CONTRACT NO. 6725 | OWNER NO. 0215 |
| CHECKED BY DATE | LOCATION MAP<br>SITE 17 – ARSENIC BURIAL AREA<br>MCCDC QUANTICO, VIRGINIA | APPROVED BY | DATE |
| COST/SCHED–AREA | | APPROVED BY | DATE |
| SCALE: AS NOTED | | DRAWING NO. FIGURE 2–3 | REV. 0 |

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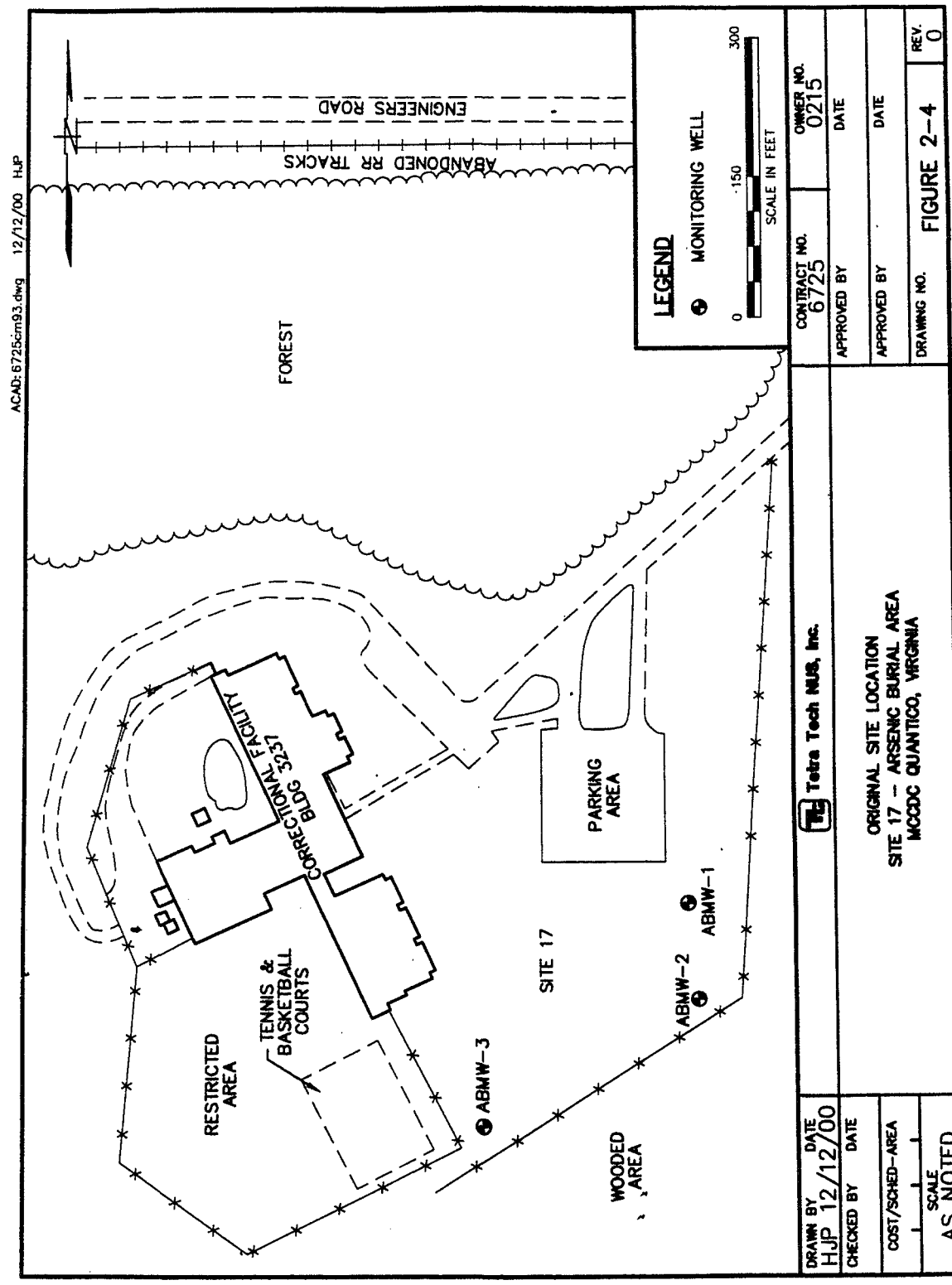
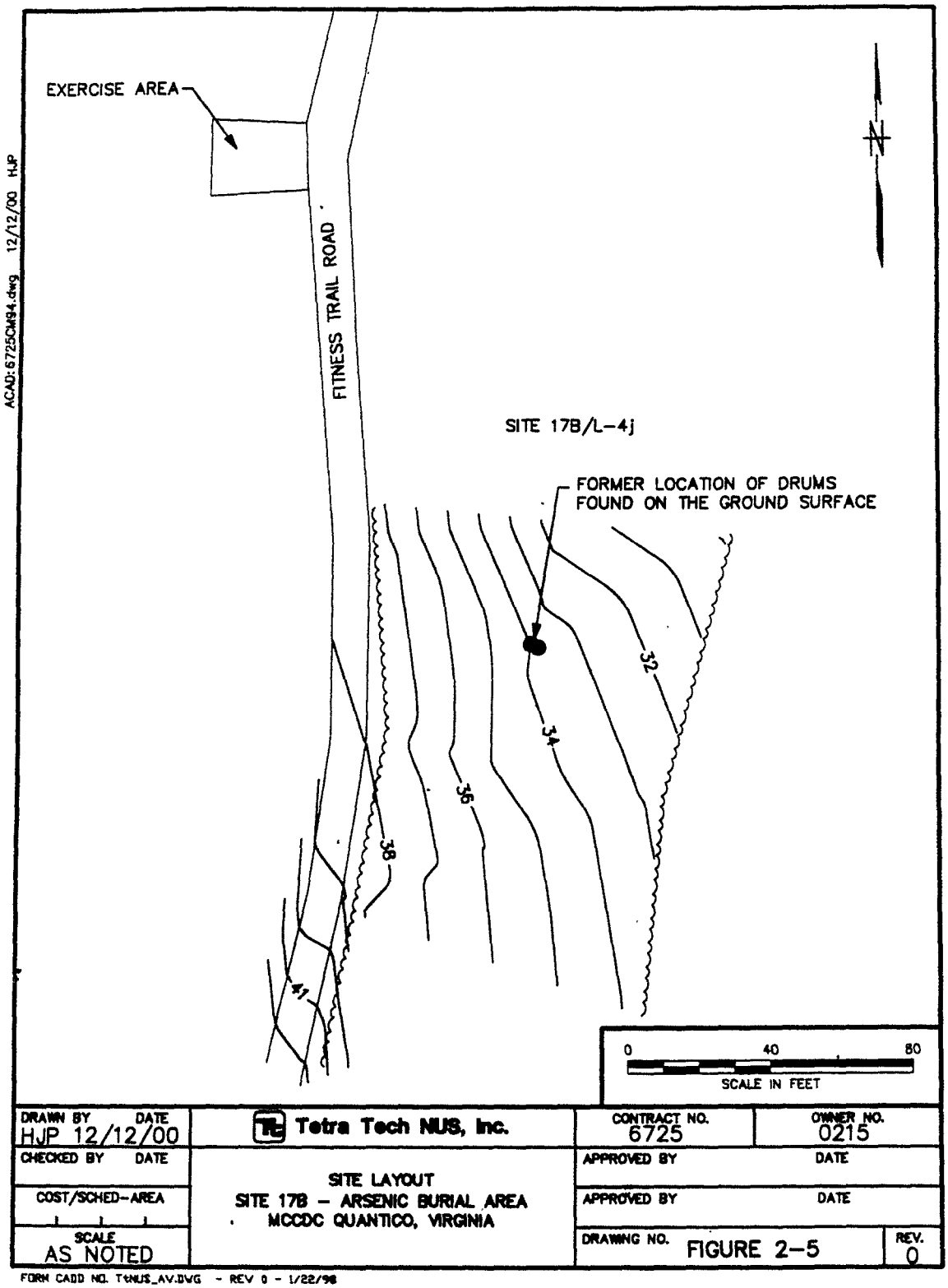

ACAD: 6725cm93.dwg 12/12/00 HJP
ABANDONED RR TRACKS
ENGINEERS ROAD
FOREST
LEGEND
MONITORING WELL
0
150
300
SCALE IN FEET
CONTRACT NO. 6725
OWNER NO. 0215
APPROVED BY
DATE
APPROVED BY
DATE
DRAWING NO. FIGURE 2-4
REV. 0
DRAWN BY HJP
DATE 12/12/00
CHECKED BY
DATE
COST/SCHED-AREA
SCALE AS NOTED
Tetra Tech NUS, Inc.
ORIGINAL SITE LOCATION
SITE 17 - ARSENIC BURIAL AREA
MCCDC QUANTICO, VIRGINIA
FORM CADD NO. TtNUS_A4.DWG - REV 0 - 1/22/98
RESTRICTED AREA
TENNIS & BASKETBALL COURTS
CORRECTIONAL FACILITY BLDG 3237
PARKING AREA
SITE 17
ABMW-1
ABMW-2
ABMW-3
WOODED AREA


EXERCISE AREA
FITNESS TRAIL ROAD
SITE 17B/L-4j
FORMER LOCATION OF DRUMS
FOUND ON THE GROUND SURFACE
32
34
36
38
41
N
0
40
80
SCALE IN FEET
ACAD:6725CM94.dwg 12/12/00 HJP
DRAWN BY DATE
HJP 12/12/00
CHECKED BY DATE
COST/SCHED-AREA
SCALE
AS NOTED
Tetra Tech NUS, Inc.
SITE LAYOUT
SITE 17B - ARSENIC BURIAL AREA
MCCDC QUANTICO, VIRGINIA
CONTRACT NO.
6725
OWNER NO.
0215
APPROVED BY
DATE
APPROVED BY
DATE
DRAWING NO.
FIGURE 2-5
REV.
0
FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

has been identified as an auxiliary site to the Old Batch Plant (another IR site). During a review of Base aerial photography (U.S. EPA, 1994) Site L4j was characterized as a previously cleared area potentially used for waste disposal and is currently being investigated by the OPMT as a DTAWS site.

### 2.2.2 Previous Investigations and Removal Actions

The Navy conducted several field investigations from 1984 to 1998 to assess the type and distribution of contaminants at Site 17. A risk assessment was also performed to evaluate the potential effects of residual contamination on human health and the environment.

An Initial Assessment Study (Fred C. Hart Associates Inc., 1984), a Confirmation Study (Radian Corp., 1988), and a preliminary Remedial Investigation (RI) (Radian Corp, 1992) were performed at Site 17 between 1984 and 1992. Soil and groundwater samples were collected during the confirmation study and the preliminary RI. No evidence was found to confirm that drums of sodium arsenite were disposed at this location. U.S. EPA required further study before a No Further Action (NFA) ROD could be supported. Therefore, additional research activities were conducted and identified two other possible disposal areas, Sites 17A and 17B (Figure 2-3), that required investigation prior to determination of NFA for the Arsenic Burial Area.

Prior to the second RI performed by Tetra Tech NUS, Inc. (TtNUS) at Site 17B, a high resolution electromagnetic (HREM) terrain conductivity survey to detect metal objects and identify other potential subsurface anomalies was completed at Site 17A in 1997. No evidence of disposal activities was found as a result of the survey, and it was concluded that Site 17A could not be the location of the drum burial area.

At Site 17B, two drums labeled as containing sodium arsenite were discovered. The contents of the drums were sampled, as well as soil from immediately beneath both drums. The two drums were overpacked and transported off site for disposal. Samples were also collected from test pits and background samples were also collected to the west of Site 17B. A baseline human health and an ecological risk assessment were performed to evaluate potential effects of arsenic concentrations in the soil.

In May 1999, a retired Base worker indicated that he believed he knew the location of the buried drums at Site 17. Based on his information, aerial photographs were analyzed to identify the location he had pointed out. Comparison of the identified location with the correctional facility, Old Batch Plant, and tree lines, concluded that the site described by the gentleman is in the approximate location where the correctional facility now stands. After careful analysis of this information, it was concluded that Site 17 had been adequately investigated.

### 2.2.3 Enforcement Actions

No enforcement actions have been taken at Site 17. The Navy has owned this property since 1918 and is identified as the responsible party.

## 2.3 COMMUNITY PARTICIPATION

In accordance with CERCLA Sections 113 and 117, the Navy provided a public comment period from October 24 through December 7, 2000, for the proposed remedial action described in the RI report (TtNUS, 1998) and the Proposed Plan (TtNUS, 2000) for the Arsenic Burial Area.

These documents were available to the public in the Administrative Record and information repositories maintained at the John Porter Memorial Library, Stafford, Virginia; the Chinn Park Regional Library, Prince William, Virginia; and the Marine Corps Research Center, Quantico, Virginia. A public notice was published in the *Potomac News* and the *Free Lance-Star* newspapers on October 23, 2000. A public meeting was held at the Quantico Crossroads Inn on Thursday, November 30, 2000. No one from the public attended the meeting. No written comments were received during the public comment period, and no comments were received during the public meeting.

## 2.4 SCOPE AND ROLE OF RESPONSE ACTION FOR SITE 17

The remedial action identified in this ROD addresses contamination associated with Site 17 as discussed in the draft RI report (Radian, 1992), final RI report (TtNUS, 1998), and the Proposed Plan (TtNUS, 2000). The selected remedy specifies that no further action be taken at Site 17, which also includes Sites 17A and 17B. Two drums labeled "Sodium Arsenite", found above ground at Site 17B, were removed and properly disposed of. The final RI was conducted to determine if contamination may have migrated from the drums before removal and to determine if there were any concerns associated with soil remaining at Site 17B. The post-removal action and RI sampling and analysis of surface and subsurface soil in the vicinity of the former location of the drums verified arsenic concentrations were within the range of site-specific background levels. Therefore, it has been determined that the source has been adequately removed, and Site 17B does not pose an unacceptable threat to public health or the environment.

## 2.5 SUMMARY OF SITE 17 CHARACTERISTICS

### 2.5.1 Site Overview

Site 17 is located southeast of the installation Correctional Facility Building 3247, and south of Building 3237 (Figure 2-3). Site 17 was suspected to have been used in 1970 for the one-time disposal of 27

30-gallon drums containing sodium arsenite. The drums were reportedly stacked in a 10-foot deep trench and covered with soil. The 30-gallon drums were reportedly from the Pest Control Shop (Building 668), which used the sodium arsenite for weed control along the Base fence lines. The topography across Site 17 is generally flat, sloping slightly to the east towards the Potomac River. Studies conducted at Site 17 have not identified evidence of disposal. The study is believed to be comprehensive and complete, and as such provided the information necessary to determine that sodium arsenate burial did not take place at Site 17 as originally suspected.

Two potential burial areas were subsequently identified: Site 17A, located near former explosives bunker 2191, and Site 17B, located south of the original study area along Fitness Trail Road and west of the railroad tracks in the eastern portion of MCCDC (Figure 2-3). Site 17A had been previously reported by Base personnel to be the suspected location of the sodium arsenite drum burial area. This area is located in a heavily wooded section of the Base used for field training exercises and physical training. The area of concern appears to have been previously disturbed and may have been located near an abandoned home. An HREM terrain conductivity survey was performed at Site 17A on February 10 and 11, 1997, to determine the absence or presence of subsurface anomalies that would be indicative of the disposal area. Although the results of the survey identified four anomalous areas, none were indicative of the disposal area. Anomaly A was interpreted to be associated with concrete in the bunker walls or footer and may also represent the presence of fill materials adjacent to the bunker. Anomaly B was interpreted to have resulted from surface metallic debris. Anomalies C and D may represent the presence of fill or reworked soils associated with a grave site as indicated by the presence of a cemetery headstone. Based on the results of the HREM survey, it was concluded that the disposal area was not located at Site 17A.

Two drums labeled "sodium arsenite" were located at Site 17B. The drums were in poor condition, and their contents were unknown. The site is located in a heavily wooded area and is surrounded by numerous pieces of iron pipe and other metallic debris. This portion of the base is generally used for field training exercises and physical training. Numerous ruts, gullies, and areas of disturbed ground characterize the terrain. The area adjacent to Site 17B was labeled Site L-4j, which is considered an auxiliary site to the Old Batch Plant. An HREM survey could not be performed at Site 17B due to an abundance of metallic surface debris that would create erratic responses in the survey. Therefore, an RI was performed at Site 17B.

The topography across Site 17B gently dips toward the northeast. The site is bound on the west by a steep ridge that trends north to south. Railroad tracks and the Potomac River bound the eastern edge of the site. The site is littered with large iron and concrete pipe sections, as well as other debris. Tank

Creek, a tributary of the Potomac River, is located south of the site and flows west to east. An eastward-trending swale located north of the site serves as the northern boundary.

### 2.5.2 Remedial Investigation for Site 17

During the investigation of Site 17, two geophysical surveys were performed, a total of 12 borings were completed, subsurface soil samples were collected from the boreholes, three groundwater monitoring wells were installed, and six rounds of groundwater sampling were conducted. A draft RI report (Radian, 1992) was completed for Site 17 to document the findings of the field investigations, however, a risk assessment was not conducted because there was no confirmed source of contamination, which resulted in no exposure pathway. The location and existence of the buried material had not been confirmed.

#### 2.5.2.1 Nature and Extent

In January 1986, a geophysical survey was conducted at Site 17 during the Verification Phase of the Confirmation Study. The geophysical survey located four anomalous zones, two of which were interpreted as possible burial site locations. The other anomalous zones were thought to be buried metal scrap. Three borings were made in the areas suspected to contain the buried drums. Twelve to fifteen soil samples were collected from each boring and arsenic concentrations ranged in the samples from less than 1 µg/g to 6 µg/g. These concentrations were found to be within the values reported to be naturally occurring in other Atlantic Coastal Plain soil (Radian, 1992).

In April 1988, a Characterization Phase of the Confirmation Study was conducted to determine whether groundwater at Site 17 had been impacted by the reportedly buried material and to attempt to locate the drums in a larger investigation area. A second geophysical survey was conducted which identified two additional anomalies, which were not previously identified. These locations were targeted for additional borings to be installed during the RI field program. Three monitoring wells were installed at the locations shown on Figure 2-4. Six soil samples were collected during the installation of the wells and analyzed for priority pollutant metals. Two sets of groundwater samples, collected two weeks apart, were collected from the wells and analyzed for pH, specific conductivity, and priority pollutant metals. Arsenic was detected in the soil at a maximum concentration of 9.4 micrograms per gram (µg/g). The highest concentration of arsenic in groundwater was detected in ABMW-1 at 58 micrograms per liter (µg/L) which slightly exceeds the U.S. EPA maximum contaminant level of 50 µg/L. The highest concentrations were detected from the wells during the second set of groundwater sampling. The concentrations of arsenic detected in the second round of sampling were at least ten times the concentrations detected in the first round of sampling. This was the case for all three wells, including the upgradient well. Therefore, it is concluded that the second round of sampling results were anomalies and not indicative of arsenic concentrations at Site 17.

In October 1991, field work was conducted for the Remedial Investigation which included the collection and sampling of soil for arsenic and lead from six additional borings installed at the two anomalies identified in 1988. The levels of arsenic present in the soil samples ranged from 0.84 mg/kg to 11.1 mg/kg. The concentration of lead in the soil samples ranged from 4.2 mg/kg to 32.7 mg/kg. It was concluded that the concentrations of lead and arsenic in these soil samples did not indicate the presence of buried waste. Table 2-1 presents the average and range of concentrations of soil samples from Site 17 and the typical background soil concentrations in the current literature at the time. Additionally, quarterly groundwater samples were collected from November 1991 to August 1992 from the three monitoring wells installed during the characterization phase investigation. During the fourth quarter sampling event, groundwater was also collected from one well installed at the former Underground Fuel Storage Area (UFSA), approximately 1,200 feet northwest of the study area, to provide additional background concentrations of arsenic and lead. Total arsenic concentrations ranged from 3.7 µg/L to 17.4 µg/L and total lead from 28.5 to 244 µg/L. The average, concentrations of the quarterly groundwater samples for the three Site 17 wells were all below the concentration found in the monitoring well located upgradient of the site (MW-101) at the UFSA (Table 2-2). In addition, the quarterly sampling was similar to the first set of groundwater samples collected in 1988, further indicating that the second set of 1988 data was an anomaly and not indicative of concentrations of arsenic in groundwater at Site 17. The results indicated that groundwater quality in the vicinity of Site 17 had not been impacted by the allegedly buried materials.

In May of 1999 a Base worker who retired in 1972, came forward to report that he believed he knew the location of the buried drums. His discussion of the drums and burial location was consistent with the description of the site as revealed during the confirmation study. Unfortunately, after visiting the area, the gentleman stated that he was unsure of the exact location since the area had changed considerably. He was able to narrow the suspect location to a 2 to 3 acre area, which was very near to the previously investigated site (located southwest of Building 3247 and south of Building 3237). The gentleman stated that he thought the burial occurred between a farmhouse and the old batch plant. However, neither the farmhouse itself nor physical evidence of its location were present.

In order to attempt to accurately locate the area, aerial photographs of the Base taken from 1954 through 1981 were analyzed. As stated by the retired employee, the burial site could be seen from the back of the farmhouse. Thus, the photographs were used to identify the location of the farmhouse in relation to the old batch plant. The corresponding tree line was also checked to ensure that the general area was correct. After locating the farmhouse on the photographs and comparing its location to the location of the correctional facility, the old batch plant, and the tree line, it was concluded that the site described by the gentleman is in the same approximate location as where the correctional facility now stands. After careful

**TABLE 2-1**

**COMPARISON OF REPORTED CONCENTRATIONS OF ARSENIC AND LEAD IN SOIL SAMPLES WITH LITERATURE VALUES SITE 17 - ARSENIC BURIAL AREA MCCDC QUANTICO, VIRGINIA**

| | 1991 Investigation | Lindsay (Lindsay, 1979) | Rose (Rose, 1979) | Levinson (Levinson, 1974) |
|---|---|---|---|---|
| **ARSENIC** | | | | |
| Average or Typical Concentration (mg/kg) | 3.97 | 5.0 | 7.5 | 5 |
| Actual or Reported Concentration Range (mg/kg) | 0.84 – 11.1 | 1.0 – 50 | NR | 1.0 – 50 |
| **LEAD** | | | | |
| Average or Typical Concentration (mg/kg) | 9.055 | 10 | 17 | 20 |
| Actual or Reported Concentration Range (mg/kg) | 4.2 – 32.7 | 2.0 – 200 | NR | 2 - 200 |

NR - Not Reported

**TABLE 2-2**

**CONCENTRATION OF ARSENIC AND LEAD**
**IN UNFILTERED GROUNDWATER SAMPLES REPORTED IN µg/L**
**SITE 17 - ARSENIC BURIAL AREA**
**MCCDC QUANTICO, VIRGINIA**

| Well | Analyte | November 1991 | February 1992 | May 1992 | August 1992 | Average for Well | Standard Deviation |
|---|---|---|---|---|---|---|---|
| ABMW-1 | As | 8.2 | 17.4 | 4.3 | 12.3 | 10.6 | 5.6 |
| | Pb | 28.5 | 84 | 41.8 | 29.5 | 46 | 26.1 |
| ABMW-2 | As | 8.4 | 17.1 | 4.5 | 10.9 | 10.2 | 5.3 |
| | Pb | 47.2 | 147 | 73.2 | 96.6 | 91 | 42.4 |
| ABMW-3 | As | 5.2 | 6.6/6.4 | 3.7 | 3.7 | 5.1 | 1.4 |
| | Pb | 244 | 6.0/50.3 | 71.6 | 33.9 | 92 | 86.1 |
| MW-101 | As | -- | -- | -- | 10.8 | -- | -- |
| | Pb | -- | -- | -- | 46.7 | -- | -- |

As Arsenic
Pb Lead

analysis of this information, it was concluded that the previous investigation at Site 17 had adequately assessed the area indicated by the retired employee.

#### 2.5.2.2 Contaminant Migration

Sodium arsenite is very soluble and would be expected to migrate with infiltrating precipitation and overland surface water runoff. However, the soil and groundwater data collected at Site 17 indicate that no migration of chemicals from the Arsenic Burial Area has occurred. Arsenic was detected in soil and groundwater, but all concentrations were comparable to literature background and upgradient concentrations.

### 2.5.3 Remedial Investigation for Site 17B

An RI was deemed necessary at Site 17B to determine if this study area was the disposal area. A summary of the RI report (TtNUS, 1998) follows.

#### 2.5.3.1 Nature and Extent of Contamination

After the contents of the two drums were sampled and analyzed for arsenic and total petroleum hydrocarbons (TPH) to ensure proper management, two surface soil samples were collected immediately beneath both drums and analyzed for arsenic, lead, and TPH. In addition, a subsurface investigation involving the installation of four test pits and the collection of five associated subsurface soil samples (plus one duplicate sample) for arsenic analysis was completed in February 1998.

The results of the drum sampling indicated arsenic concentrations of 73,700 µg/L and 6,010 µg/L in the two 30-gallon drums found at the site. The TPH concentration in one of the drums was 0.762 mg/L, while the second drum exhibited a TPH concentration less than the detection limit of 0.302 mg/L. Following sample analysis, the two drums were removed and transported to an approved disposal facility.

The surface soil sampling results indicated the presence of arsenic at 8.0 milligrams per kilogram (mg/kg) and 9.9 mg/kg. TPH and lead were not detected in either of the samples. The five subsurface soil samples collected from the four test pits installed at the site contained arsenic at the following concentrations: 6.8 mg/kg (1 to 2 feet deep); 1.3 mg/kg and 1.8 mg/kg (2 to 3 feet deep); 1.3 mg/kg and 1.3 mg/kg (3 to 4 feet deep); and less than 0.22 mg/kg (5 to 6 feet deep). The frequencies of detection and maximum concentrations of chemicals detected in surface and subsurface soil samples are shown in Table 2-3. The locations of the surface and subsurface soil samples collected at Site 17B during the Rl are shown on Figure 2-6.

Background Soil Concentrations

Seven background surface soil samples and seven background subsurface soil samples were collected west of Site 17B. The positive analytical results for the site-specific background samples collected in the vicinity of Site 17B are summarized in Table 2-4. Arsenic was detected at maximum concentrations of 8.6 mg/kg in the surface soil and 8.6 mg/kg in the subsurface soil.

For arsenic, the subsurface soil and surface soil data sets for Site 17B were grouped together to assess human health risks and then were compared to the site-specific background data for all depths. In addition, because the human health risk assessment required a separate assessment of surface soil exposure, the site surface soil data subset was compared to background surface soil data. Only a comparison to the 95 percent upper tolerance limit (UTL) was used in the evaluation. The UTL for arsenic was determined to be 9.07 mg/kg in all soil (surface and subsurface) and 9.43 mg/kg in surface soil.

Selection of Chemicals of Potential Concern

Chemicals of Potential Concern (COPCs) at the site were selected using U.S. EPA Region III residential and industrial risk-based concentrations (RBCs) (U.S. EPA, 1998) and U.S. EPA soil screening levels (SSLs) for migration from soil to air (U.S. EPA, 1996). Inorganic chemicals detected at concentrations exceeding residential RBCs or SSLs were compared to site-specific background soil concentrations, specifically the UTL of the background data set for the same chemical. In addition, U.S. EPA Region III Biological Technical Assistance Group (BTAG) ecological screening levels (U.S. EPA, 1995) were used for comparison to Site 17B soil concentrations. Two potential sources at Site 17B were investigated: surface soil beneath the two empty drums and subsurface soil beneath this site. The concentrations of arsenic detected in the surface soil and subsurface soil were comparable to or below site-specific background concentrations. Therefore, arsenic was not retained as a COPC for surface or subsurface soil.

#### 2.5.3.2 Contaminant Migration

Sodium arsenite is very soluble and would be expected to migrate with infiltrating precipitation and overland surface water runoff. However, the soil data for Site 17B indicate that no significant migration of chemicals has occurred. Arsenic was detected in surface and subsurface soil samples, but all concentrations were comparable to site-specific background soil concentrations. Consequently, it does not appear that a release of arsenic occurred from the drums at Site 17B.

**TABLE 2-3**

**OCCURRENCE AND MAXIMUM CONCENTRATIONS**
**OF CHEMICALS DETECTED IN SURFACE AND SUBSURFACE SOIL**
**SITE 17B – ARSENIC BURIAL AREA**
**MCCDC QUANTICO, VIRGINIA**

| Chemical | Frequency of Detection | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) | Location of Maximum | Background 95% UTL (mg/kg) |
|---|---|---|---|---|---|
| **SURFACE SOIL** | | | | | |
| Arsenic | 2/2 | 8.0 | 9.9 | ABA-SS-002-0101 | 9.43 |
| TPH | 0/2 | ND | ND | None | NA |
| Lead | 0/2 | ND | ND | None | NA |
| **SUBSURFACE SOIL** | | | | | |
| Arsenic | 6/7 | 1.3 | 6.8 | ABA-TP-02B-0102 | 9.07 (All Soil) |

NA Not applicable
ND Not detected
TPH Total Petroleum Hydrocarbons
UTL Upper Tolerance Limit

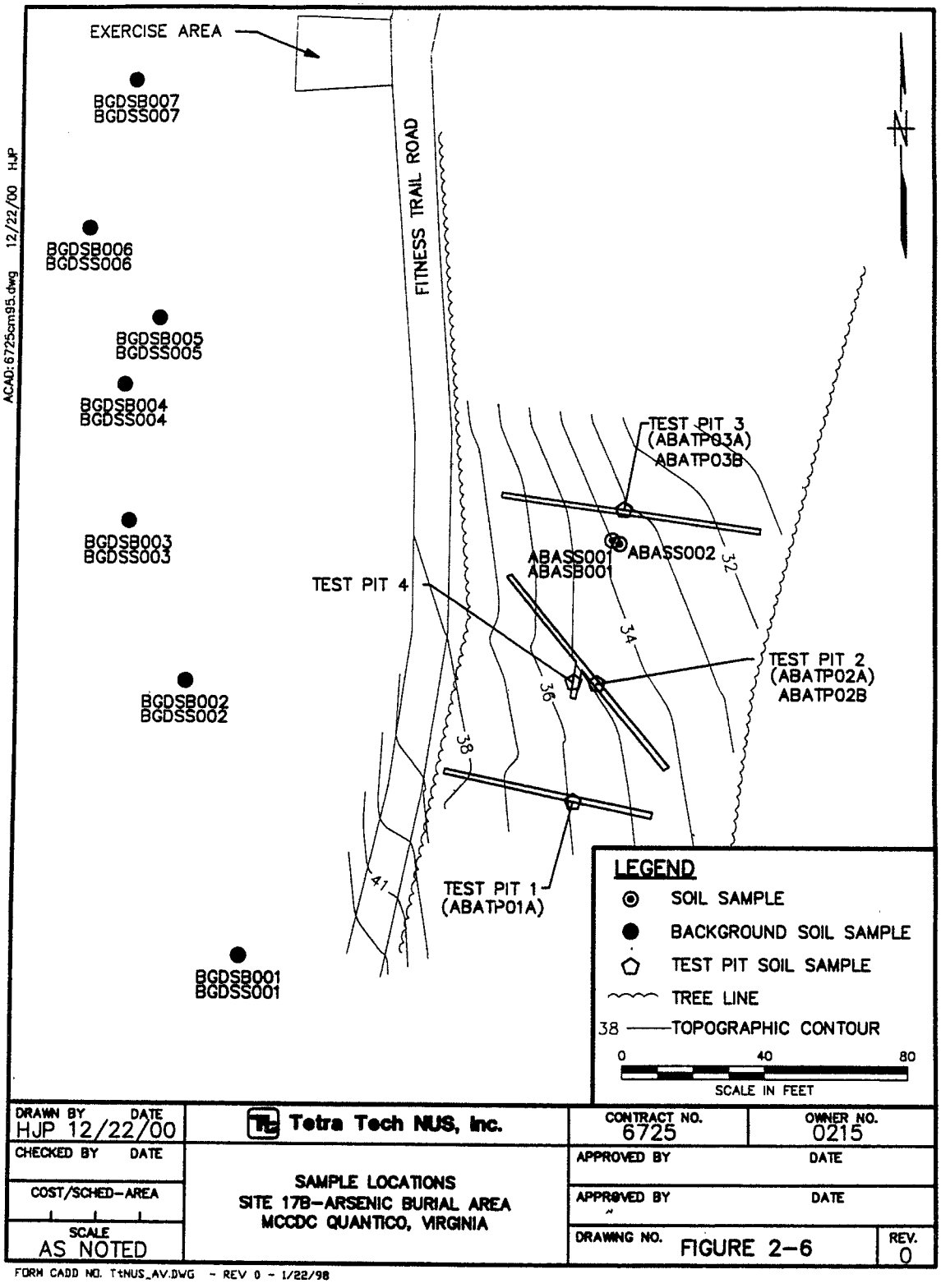

EXERCISE AREA
BGDSB007
BGDSS007
BGDSB006
BGDSS006
BGDSB005
BGDSS005
BGDSB004
BGDSS004
BGDSB003
BGDSS003
BGDSB002
BGDSS002
BGDSB001
BGDSS001
FITNESS TRAIL ROAD
TEST PIT 3
(ABATP03A)
ABATP03B
ABASS001
ABASB001
ABASS002
TEST PIT 4
TEST PIT 2
(ABATP02A)
ABATP02B
TEST PIT 1
(ABATP01A)
32
34
36
38
41
N
ACAD:6725cm95.dwg 12/22/00 HJP
LEGEND
SOIL SAMPLE
BACKGROUND SOIL SAMPLE
TEST PIT SOIL SAMPLE
TREE LINE
38 TOPOGRAPHIC CONTOUR
0 40 80
SCALE IN FEET
DRAWN BY DATE
HJP 12/22/00
CHECKED BY DATE
COST/SCHED-AREA
SCALE
AS NOTED
Tetra Tech NUS, Inc.
SAMPLE LOCATIONS
SITE 17B-ARSENIC BURIAL AREA
MCCDC QUANTICO, VIRGINIA
CONTRACT NO.
6725
OWNER NO.
0215
APPROVED BY
DATE
APPROVED BY
DATE
DRAWING NO.
FIGURE 2-6
REV.
0
FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

**TABLE 2-4**

**OCCURRENCE AND MAXIMUM CONCENTRATIONS OF CHEMICALS DETECTED IN BACKGROUND SOIL SITE 17B – ARSENIC BURIAL AREA MCCDC QUANTICO, VIRGINIA**

| Chemical | Frequency of Detection | Minimum Concentration (mg/kg) | Maximum Concentration (mg/kg) | Location of Maximum | Background 95% UTL (mg/kg) |
|---|---|---|---|---|---|
| **SURFACE SOIL** | | | | | |
| Arsenic | 7/7 | 5.2 | 8.6 mg/kg | BGD-SS-006-0001 | 9.43 |
| **SUBSURFACE SOIL** | | | | | |
| Arsenic | 7/7 | 4.2 | 8.6 mg/kg | BGD-SB-005-0304 | 9.07 (All Soil) |

NA Not applicable
ND Not detected
UTL Upper Tolerance Limit

## 2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Site 17 is located southeast of the Correctional Facility, Building 3247. The Correctional Facility's parking lot is north of the study area and was unpaved. The area has no designated use except as an open area buffer zone surrounding the brig. Unauthorized personnel in the area are monitored by the Correctional Facility's guards (Radian, 1992).

Site 17B lies between a fitness trail and a railroad grade. The trail and railroad, running north to south, are roughly parallel at the site and approximately 100 feet apart. The site is located in a wooded area that is currently used for field training and physical exercises. The area on both sides of the fitness trail is a young forest appearing to be about 20 years old. The forest on the western side of the trail appears older, with a closed canopy over most of the area. Tulip poplar is the dominant tree on the younger eastern side of the trail where Site 17B is located. It is replacing dying "pioneer" trees such as cottonwoods. Vines, blackberries, and grasses grow in open areas.

The Arsenic Burial Area is currently a military land use area and is anticipated to either remain a military land use area or become an industrial or commercial land use area. The mission of the base is currently expanding, and the potential for Base closure and development for residential land use is considered minimal. Groundwater in the aquifer beneath the Arsenic Burial Area is not a current source of drinking water.

## 2.7 SUMMARY OF SITE 17 RISKS

A baseline risk assessment was not performed for Site 17. The location or existence of the disposal had not been confirmed. The ecological and human health risks associated with exposure to contaminated media at Site 17B were evaluated in the RI report (TtNUS, 1998).

Arsenic concentrations in soil at Site 17B were comparable to site-specific background levels. Therefore, arsenic was not selected as a COPC for the human health risk assessment, and risk estimates were not developed. Since no COPCs were identified for Site 17B, a quantitative exposure assessment was not performed. Screening against the Region III BTAG level of 328 mg/kg for flora in soil indicated a lack of unacceptable risk to ecological receptors (Hazard Quotient of 0.03) due to arsenic in surface and subsurface soil at Site 17B. In addition, arsenic concentrations in samples collected at Site 17B were comparable to site specific background soil concentrations.

### 2.7.3 Summary, Conclusions, and Recommendations

The major findings for Site 17 and Site 17B, based on the Draft 1992 RI (Radian, 1992) and the 1998 RI (TtNUS, 1998) are summarized below.

- Levels of arsenic in the soil and groundwater at Site 17 were within the reported range of regional literature values for soil and groundwater.

- Arsenic concentrations in the surface soil at Site 17B were within site-specific background levels and concentrations of arsenic in the subsurface soil were less than arsenic concentrations in the surface soil. Consequently, it does not appear that there was a release of arsenic from the drums that were discovered at Site 17B.

- Screening against Region III BTAG levels indicate a lack of unacceptable risk due to arsenic at Site 17B. In addition, arsenic levels at Site 17B are similar to site-specific background concentrations. Therefore, no further action is warranted.

- The human health risk assessment for Site 17B considered exposures to current and future base personnel, current and future adolescent and adult trespassers, future construction workers, and hypothetical future residents. Concentrations of arsenic in surface and subsurface soil were comparable to background levels. Based on the results of the human health risk assessment, Site 17B does not pose a threat to public health.

The Arsenic Burial Area is recommended for No Further Action based on the following information:

1. Extensive investigation activities were conducted at Site 17 to locate the burial area.

2. The drums that were discovered at Site 17B were removed, and no visual evidence of contamination remains at the site.

3. Soil samples collected at Site 17B yielded concentrations of arsenic consistent with site-specific background levels.

4. No site related COPCs were selected for Site 17B.

## 2.8 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected remedy is the same alternative identified as the recommended alternative in the Proposed Plan (TtNUS, 2000), which was presented to the public at the public meeting held on November 30, 2000. There are no changes in the ROD to the recommended remedial action alternative recommended in the Proposed Plan.

# 3.0 RESPONSIVENESS SUMMARY

## 3.1 BACKGROUND ON COMMUNITY INVOLVEMENT

The Navy-Marine Corps and MCCDC Quantico have implemented a comprehensive public involvement program for several years. Beginning in 1994, a Technical Review Committee (TRC) had met approximately once every 2 years to discuss issues related to investigative activities at MCCDC Quantico. The TRC is composed mostly of governmental personnel; however, some private citizens attend the meetings on occasion.

MCCDC has taken several public surveys of people living on the Base or in nearby communities to determine whether a Restoration Advisory Board (RAB) was needed. In every case, the surveys indicated that the formation of a RAB was not warranted.

Community relations activities for the final selected remedy for Site 17 included the following:

- The documents concerning the investigations and analysis, as well as a copy of the Proposed Plan, were placed in the information repository at the Marine Corps Research Center, the John Porter Memorial Library, and the Chinn Park Regional Library.

- Newspaper announcements on the availability of the documents and the public comment period/meeting date were placed in the *Potomac News* and the *Free Lance-Star* on October 23, 2000.

- The Navy established a 45-day public comment period starting October 24, 2000 and ending December 7, 2000 to present the Proposed Plan for Remedial Action. No written comments were received during the 45-day public comment period.

- A Public Meeting was held November 30, 2000 to answer any questions concerning the Arsenic Burial Area (Site 17) Proposed Plan. Approximately 10 people, including Federal, state, and local government representatives, attended the meeting. No one from the public attended the public meeting.

## 3.2 STAKEHOLDER ISSUES AND LEAD AGENCY RESPONSES

No written comments, concerns, or questions were received by the Navy, U.S. EPA, or the Commonwealth of Virginia during the public comment period from October 24 to December 7, 2000. A public meeting was held on November 30, 2000, to present the Proposed Plan for the Arsenic Burial Area

soil and groundwater and to answer any questions on the Proposed Plan and on the documents in the information repositories. A period was set aside for formal questions to be recorded by the court reporter. However, no one from the public attended the meeting.

### 3.3 TECHNICAL AND LEGAL ISSUES

There are no technical or legal issues concerning the selected remedial action at this site.

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